IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex Parte KEVIN CINK, JEFFREY C. SMITH, JAMES NANGERONI AND JED RICHARD RANDALL

Application 10/593,111

Art Unit: 1796

REPLY BRIEF

This reply brief is being filed pursuant to 37 CFR §41.41.

1. Extruded vs. bead foam process

At several places in her answer, the Examiner asserts that a bead foam process as described in the Shinohara reference includes an extrusion foaming process such as is now being claimed (and is described, for example in the Hammel reference). The examiner's assertion is unsupported by the references and is in fact incorrect.

Applicant's claim 27 describes the elements of an extrusion foaming process. In an extrusion foaming process, a pressurized, molten mixture of a polymer and blowing agent is formed. The molted mixture is then extruded through a die to a region of reduced pressure such that the blowing agent expands and the polymer simultaneously cools to form a stable foam.

A bead foam process is entirely different. In the bead foam process, polymer beads are formed. These are impregnated with blowing agent. To form a foam, the beads are loaded into a mold and heated to soften them and to volatilize the blowing agent, so that the beads expand and adhere to each other, forming a molded foam article. In a bead foam article, no molten mixture of polymer and blowing agent is formed, and then extruded to a

low pressure regions, so such that the blowing agent expands and the polymer simultaneously cools to form a stable foam.

A bead foam process as just described is exactly what is described in the Shinohara reference. Paragraphs [0011] – [0013] describe forming the polymer into particles. Paragraphs [0015] – [0018] describe impregnating the particles with the blowing agent. Paragraphs [0019] and [0020] describe expanding the impregnated particles. At no point in Shinohara's process is a molten mixture containing the polymer and blowing agent ever formed, and then passed through a die to a reduced pressure region where the polymer cools and the blowing agent simultaneously expands.

To be sure, Shinohara does state that the starting polymer particles can be made by an extrusion process (paragraph [0011]). However, this extrusion step is only a preliminary step in the process. It is not conducted in the presence of blowing agent (which is subsequently impregnated into the particles), and no foam is formed in Shinohara's particle extrusion step. In Shinohara's process, no foam is made until the impregnated particles are expanded.

The examiner similarly misreads the Chaudhary reference. First, Chaudhary unambiguously distinguishes between extrusion foam processes on the one hand (*see, e.g.* column 23 line 1 through column 24 line 37) from bead foaming processes, which he describes separately starting at column 24 line 38. Chaudhary's description of the bead foaming process is essentially the same as Shinohara describes. Blowing agent-impregnated beads are formed using various methods (column 24 line 50 through column 25 line 47). These beads are then expanded and molded by heating to "effect coalescing and welding" of the beads, as described at column 25 lines 48-64.

Like Shinohara, Chaudhary teaches that the expandable beads can be made (not formed into foam) in an extrusion process. *See* column 25 lines 17 through 31. In the cited passage, Chaudhary adds the detail that the polymer and blowing agent can be extruded together to form expandable beads. However, this still is not an extrusion foaming process as applicants' claim (or as the Hammel reference teaches). Chaudhary specifically states that the mixture of blowing agent and polymer is cooled "to a temperature below that at which foaming occurs" before the mixture is passed through the die (column 25 line 21-22). Chaudhary then specifically states that the product of this extrusion is "expandable", not "expanded".

Therefore there is no basis for the examiner's repeated assertion that a bead foam process such as described in Shinohara is the same as or includes an extrusion foaming process as the applicants are claiming, and as the Hammel reference describes. The extrusion and bead foaming processes are well-recognized as being distinct, as evidenced by the Chaudhary reference. Hammel and Shinohara relate to different processes, and are not combinable.

"Weld nature" and "Die Shape Reproducibility"

On pages 12-13 of her answer, the examiner erroneously states that the terms "weld nature" and "die shape reproducibility", as used by the Shinohara reference, relate to "foam strands, sheets, board, or other extruded foam shapes.

The examiner states that applicants have provided no evidence for their position that "weld nature" and "die shape reproducibility" relate solely to bead foam processes. This is incorrect. Applicants have repeatedly pointed out that the Shinohara reference explicitly uses those terms only to describe bead foam processes, as is seen by examining paragraphs [0003], [0032] and [0035] of the Shinohara reference.

It is the examiner who has provided no evidence for her position. The examiner has cited no document whatsoever which relates the attributes of "die shape reproducibility" or "weld nature" to any type of process, other than the bead foaming process described by Shinohara.

Therefore, Shinohara's statements regarding "weld nature" or "die shape reproducibility" would have no relevance whatsoever to those skilled in the art of extrusion foaming. Those statements provide no basis to combine the disparate processes described in the Shinohara and Hammel references.

JP 2002-322309

On page 17 of the examiner's answer, she states that "JP 2002-322309 teaches away from the instantly claimed invention" and "is therefore not closer to the instantly claimed invention than either Hammel or Shinohara".

The first of these statements is exactly correct, and clearly supports the patentability of applicants' claims. In JP 2002-322309 there is described an extruded foam made with 4.5% carbon dioxide, which is a failure. This reference clearly would discourage one from using higher levels of carbon dioxide than are described in the Hammel reference.

Applicants' success using still higher amounts is therefore unexpected, when all the prior art is considered, not merely the references the examiner chooses to rely upon.

The second of the examiner's statements, however, is plainly wrong. The process described in JP 2002-322309 is clearly closer to applicant's process because of the amount of carbon dioxide blowing agent that is described. It is clearly closer than Shinohara, because JP 2002-322309 describes an extrusion process, not a bead foaming process. JP 2002-322309 evidences the unexpected effect obtained with applicants' invention, and so supports the patentability of applicants' process claims.

Respectfully submitted,
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